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Morphological and electrical conductivity properties of unsubstituted polythiophene nanostructures prepared by surfactant-assisted chemical polymerization method

S. Murugavel, M. Malathi*

Condensed Matter Research Laboratory, Materials Physics Division, School of Advanced Sciences, VIT University, Vellore – 632 014, Tamil Nadu, India

Abstract: Unsubstituted polythiophene (UPT) nanostructures were successfully prepared via soft template oxidative polymerization method using SDS, TTAB and Triton X-100 as anionic, cationic and nonionic surfactants respectively. During the polymerization, unsubstituted thiophene monomer was polymerized into unsubstituted polythiophene at the presence of surfactants and which confined the polymerization of thiophenes into low dimensional nanostructures. The synthesized UPT samples were characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Field emission scanning electron microscopy (FE-SEM) and High resolution-transmission electron microscopy (HRTEM). Also electrical conductivity of the UPT samples checked by standard four-point probe method. The effects of different surfactants on the morphology and electrical conductivity of UPT were studied and compared. FTIR spectroscopy confirmed the incorporation of surfactants into UPT. FESEM and HR-TEM studies proved that the surfactants affected the morphology of final products. Additionally, SDS was found capable of increasing the electrical conductivity of UPT.
Keywords: Unsubstituted polythiophene**,** Surfactants**,** Morphology**,** Electrical conductivity.

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